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Min egen FÆRDSELSBOG

Udarbejdet af vicepolitiinspektør Groes-Petersen og propagandachef Tage Kyster i samarbejde med gymnastikinspektørerne Else Thomsen og H. P. Langkilde.
Tegninger af Palle Wennerwald.

Udgivet af Justitsministeriets udvalg for større færdselssikkerhed.

X-HV 676
.A1 N2

Cement Burning

(Including Fuel Handling)

#2

Industrial Safety Series Pamphlet No. Cem. 3

Published by National Safety Council, Inc.
20 North Wacker Drive, Chicago

1. This pamphlet is one of a series dealing with the elimination of hazards encountered in the manufacture of Portland Cement. Other pamphlets of the series are:

Cem. 1, "Cement Rock Quarrying and Crushing."

Cem. 2, "Raw and Finished Cement Mill Grinding."

Cem. 4, "Cement Mill Shops."

Cem. 5, "Cement Storing, Packing and Shipping."

Cem. 6, "Cement Mill Yards and Railroads."

2. Portland Cement Association reports covering the accident experience of 116 plants show that the cement burning department exceeds all others, except the quarry, in percentage of lost-time accidents and time lost. Sixteen percent of all lost-time accidents and 11.5 percent of all time lost because of accidents are charged against this department.

Fuel Handling and Use

3. The use of naked flames, such as lamps and torches, should not be permitted around fuel storage tanks or other fuel equipment, except when needed to light the burners. "No smoking" restrictions should be rigidly enforced. Vapor proof electric lights, of a type listed as standard by the Underwriters' Laboratories, should be installed at all points where artificial illumination is necessary. Electrical equipment should follow the recommendations given in Safe Practices Pamphlet No. 29, "Electrical Equipment in Industrial Plants," and No. 34, "Industrial Explosion Hazards."

Gas

4. Because gas mixes with air so readily, any leaks may have serious consequences, and extreme care must be used in the layout and maintenance of gas handling equipment. All gas piping

> This Pamphlet is a compilation of experience in accident prevention, with particular emphasis on safe practices. It must not be confused with Federal, State or Insurance requirements, nor with National Safety Codes.

should be run as directly as possible from the point of supply to the burners and should be carefully installed and well protected against mechanical injuries. All pipes, tanks, heaters, valves, and regulators should be inspected at frequent, regular intervals for possible defects, which should be corrected without delay. Every man in the burning department should know the location of the main gas shut-off valve so there will be no delay in shutting off the gas supply in case of emergency. Quick acting, safety shut-off valves should be installed in main gas lines and, if possible, these valves should be made to operate both automatically and manually.

5. When gas tanks or holders are used, they should be located at a safe distance from buildings, where they will not be a hazard to life and property.

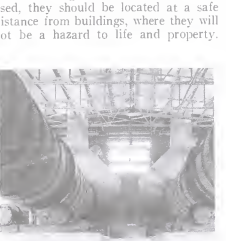

Figure 1. A battery of modern cement kilns. Note the good housekeeping conditions.

Before any work is attempted in any tank or holder it should be emptied of gas and purged. The men entering such tanks should wear suitable life lines and fresh air hose masks. One or more attendants should also be placed just outside the tank or holder, with instructions to be on the alert to assist the worker in case he is overcome by fumes, or in any other emergency. (See also Safe Practices Pamphlet No. 64, "Respirators, Gas Masks, Hose Masks, and Breathing Apparatus.")

6. The general practices for lighting a gas heated kiln are:

(a) Make sure that the air and gas valves are closed.

(b) Make sure all vents are open

(c) Apply torch to burner. (In case pilot lights are not installed.)

(d) Turn on the gas.

(e) Open the air valve slowly.

7. Safety cut-off valves should be installed in gas lines before the burners, so that they will automatically cut off the flow of fuel in case of failure of the air blast. Installation of these valves should also provide for their manual operation. (See Fig. 2.)

8. Where possible pilot lights should be installed to facilitate lighting the kiln. Pilot lights should be kept burning at all times so that in case the burner snuffs out, it will again be lighted immediately and thus eliminate possibility of explosion.

Oil

9. Storage tanks for fuel oil should be located underground and at least 50 feet from important buildings. The top of an underground tank should be below the level of the lowest pipe line running from it, and not less than two feet below the surface of the ground. Tanks may be permitted under certain conditions underneath a building, if buried at least two feet below the lowest

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X-HV676
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#3

Safe Practices in Cleaning and Finishing Rooms in Foundries

Industrial Safety Series No. Me. 1

Published by National Safety Council, Inc.
20 North Wacker Drive, Chicago

This pamphlet is a compilation of experience in accident prevention, with particular emphasis on safe practices. It must not be confused with Federal, State or Insurance requirements, or with National Safety Codes.

Introduction

1. The cleaning and finishing room of the foundry is an important department, through which all the output must pass to be cleaned, inspected, and, in some cases, painted before the finished product is shipped to the customer.

2. In this pamphlet safe practices in these various operations will be discussed in the order in which the material is handled; first, the "shaking-out" operations, then the roughing or flogging floor, the annealing or heat-treating department, tumbling sand-blasting, chipping, grinding, welding, machining, painting, inspecting, and finally loading.

Shaking-Out Operations

3. After the castings are poured and have been allowed to cool in the sand, they are removed from the molds and the process of cleaning is begun.

OF PARTICULAR INTEREST TO FOREMEN

Care of crane slings, paragraphs 7-8.
How to light oil or gas furnaces, paragraphs 18-20.
Locking and shifting device for tumblers, paragraph 28.
Why grinders bump their wheels, paragraph 38.
Protecting eyes of welders, paragraphs 52-55.
Care of hand tools, paragraphs 80-84.
Misuse of compressed air hose, paragraphs 87-90.
Clean air for cleaning and finishing rooms, paragraphs 91-98.

Chaining Steel Castings

4. The proper chaining of castings for removal from the molds is of particular importance. Where the castings are handled by overhead cranes, improper chaining increases the danger of material dropping on the workmen. In steel foundries it is considered a safe practice to attach the chains to the heads or risers of the castings, after the runner-cups have been removed. Heads or risers of steel rarely break under this strain. Continuous sling chains are often used in steel foundries, the chains being wrapped around the heads of several castings and all hoisted at once. Strict supervision should be maintained to insure that workmen do not overload slings, for should they break, falling castings may injure chainmen or other workers on the floor. (See

Figure 1. Careless chaining. Three sling hooks should have been used. See Paragraph No. 4.

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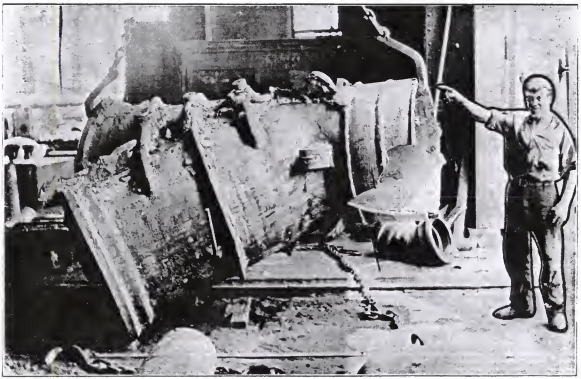

Figure 1. Careless chaining. Three sling hooks should have been used. See Paragraph No. 4.

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National safety council, inc.

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Linemen's Rubber Protective Equipment

Industrial Safety Series Pamphlet No. P. U. 3

H5

Published by National Safety Council, Inc.

20 No. Wacker Drive, Chicago

1. Linemen's rubber equipment such as gloves, sleeves, blankets, insulator hoods and line hose should be subjected periodically to electrical and mechanical tests and to visual inspection. The testing and inspection methods discussed in this pamphlet outline the practices which are followed by a great many organizations.

2. Linemen's rubber coats, boots, hats, and suits should not be relied upon for protection against electrical shock. Such equipment, therefore, is not tested electrically but it should be carefully inspected and stored as indicated in paragraphs 36 to 66.

3. When rubber protective material is received from the manufacturer, it should be consigned immediately to the testing laboratory. Visual inspection should first be made to detect pin holes, cuts or imbedded foreign matter. All goods which pass inspection should then be submitted to standard electrical tests. It is suggested that rubber protective equipment (except rubber gloves) should not be used on voltages from phase to ground in excess of one-third the test voltages.

4. Articles which are tested between dry electrodes should again be inspected to see if they have been damaged by corona cracking during the test. It is advisable to keep an accurate record of all rubber goods tested.

Electrical Tests

5. The laboratory man himself must exercise care when testing material and remain at a safe distance from energized equipment. The equipment should be placed in an enclosure and enclosures of metal fence or screen should be grounded. Provision should be made to de-energize automatically the testing apparatus whenever the operator leaves the control or whenever the gate of the enclosure is opened.

6. Two types of apparatus required for testing electrical workers' rubber protective equipment are indicated in the wiring diagrams shown in Figure 2 and Figure 3. In many laboratories transformers with 5 kv-a., 50,000 volt rating are used. (See A.S.T.M. specifications paragraph 18, page 15.) Other apparatus should, of course, be rated accordingly.

> This pamphlet is based on the accident prevention experience of a number of employers. However, it should not be assumed that every acceptable safety procedure is contained herein. The pamphlet should not be confused with federal, state or insurance requirements, nor with national safety codes.

7. For convenience it is desirable to provide two milliammeters, one having a full scale reading of 25 milliamperes and the other of 150 milliamperes. Milliammeters must be kept short-circuited except when leakage current readings are being taken. Sometimes an ammeter is used in place of a milliammeter, it being inserted in the secondary of a special current transformer. In this instance the current transformer is usually designed so that it becomes saturated soon after its current rating is exceeded, thus protecting the ammeter from damage. If an ammeter and current transformer are used, no additional precautions to protect the ammeter are necessary.

8. Other approved means of voltage control and measurement are listed in the A.S.T.M. Standard Specifications for Electrical Workers' Rubber Gloves. (See Appendix A.)

9. It is advisable to provide permanent devices for testing rubber goods, such as gloves, line hose, insulator hoods and blankets, as shown in Figures 10 and 18 to 29 inclusive. This will insure uniform tests. Whenever possible, tests should be made with water electrodes. This method eliminates the possibility of corona cutting and a more positive test is obtained.

Gloves*

*Companies or persons desiring detailed information on the procedure of glove testing recommended by the Edison Electric Institute are referred to Pamphlet No. 055 or revisions covering "Inspection, Retest and Use of Electrician's Rubber Gloves," available from that organization.

10. Gloves should be carefully inspected on the outside, then turned and inspected on the reverse side. To be acceptable, they should be free from defects which impair the electrical or mechanical properties of the material or which are likely to impair these properties during the life of the gloves. (See paragraph 41.)

11. Gloves received in the testing laboratory, as well as the testing apparatus, should be kept clean. The size, length and thickness of the gloves should be checked. A suitable type of micrometer for measuring the thickness of rubber gloves is shown in the A. S. T. M. Standard Specifications. (See Appendix A, Figure 51.)

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"Standard Specifications for Rubber Gloves for Electrical Workers" have been formulated by the American Society for Testing Materials. These specifications are included as Appendix A.

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National safety council, inc.

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A-HV 010
.A1N2
#7

The Safe Operation of Vulcanizers and Devulcanizers

Industrial Safety Series No. Ru-2

Published by National Safety Council, Inc.
20 North Wacker Drive, Chicago

Vulcanizers

1. A vulcanizer, or heater as it is commonly known, is an unfired vessel built to hold steam under pressure. For certain operations, hot water, gas, or air instead of steam may be under pressure, as in pot heaters and shoe vulcanizers. Heaters are used for vulcanizing or curing rubber. Vulcanizers discussed in this pamphlet are those having cylindrical bodies or shells of boiler plate with one or both ends open and having cast flanged rings to support the door or doors.

2. In general, there are two types of vulcanizers. First, the horizontal type with hinged doors (sometimes supported by wheels which swing on a floor track) or doors running in vertical guides, or removable doors. In this type, the rubber is placed in molds, press plates, on forms, rolls, reels, drums, poles, or in pans. The second type is the vertical type, of which there are two subdivisions. One is that commonly used for curing tires, in which a hydraulic ram is used to compress the molds in the vulcanizer, the molds being in contact with steam. The other vertical type is the pot heater; this is a vulcanizer usually less than 8 feet in depth. The object to be cured is placed in rolls in the heater, the cover secured, and the product either cured by steam alone or by filling the heater with water into which steam is admitted, so that the cure is by hot water under pressure.

3. There is still a third type, however, known as a jacketed vulcanizer. This type has an outer and inner shell properly supported, and space for steam between the two shells. Single jacketed heaters with internal steam coils accomplish vulcanization in the same manner as this type.

This pamphlet is a compilation of experience in accident prevention, with particular emphasis on safe practices. It must not be confused with Federal, State or Insurance requirements, or with National Safety Codes.

4. The major accident hazards encountered in the operation of vulcanizers are:

(a) Rupture and explosion of vulcanizers.

(b) Doors blown open by internal pressure by reason of improper, inadequate, or defective door fastenings.

(c) Premature opening of doors with pressure within.

(d) Cracks in doors, which may occur as extensions from the bolt slots in bolted type doors, and are mainly due to operator's drawing up the door bolts unevenly and causing metal strain.

(e) Men being struck by molds toppling from top of ram on tire vulcanizers when ram is run up so high as to expose molds above heater.

(f) Ram on vertical tire vulcanizers toppling over if permitted to creep out of cylinder.

(g) Injuries from steam or molds or plate covering spider at top of ram on tire vulcanizer when provision is not made for release of possible steam generated within the ram.

(h) Possibility of man being trapped in heater, and correlated hazards in case of necessity of entering vulcanizer to free jammed or derailed car.

(i) Stripped bolts which occur from constant use causing excessive wear, drawing up bolts too tightly, and from use of worn out, uneven gaskets.

(j) Burns and scalds from manholes sliding aside under pressure, brought about by improper preparing, placing, or drawing up of covers.

(k) Leaky and worn gaskets becoming loose and permitting excess steam and hot water to escape, causing scalds and burns.

(l) Burns and scalds from steam entering an open heater through blow downs using common drains.

(m) Burns and scalds from blowing off of various valves poorly located.

(n) Burns and scalds from hot pipes, doors, molds, cars, non-jacketed surfaces, materials being cured, hot water, and steam.

(o) Bruises and lacerations from handling doors, tracks, hoists, materials etc., in connection with vulcanizer operations.

General Design and Specifications

5. All designs and specifications should conform to the Unfired Pressure Vessel Code of the American Society of Mechanical Engineers or to the codes of the governing authorities. The latter codes are to all intents and purposes identical with the A.S.M.E. Code.

6. Preferably, vulcanizers should be designed to withstand main line steam pressure, so that in case the reducing valve or automatic regulator fails to function, the unit still has sufficient strength to withstand main line pressure if necessary. (See paragraphs 21 and 96.) In no case should the unit be designed for a working pressure less than $\frac{1}{3}$ main line steam pressure.

7. Consideration should be given the conditions under which vulcanizers are to be operated, when specifying the thickness of the metal, to compensate for active corrosion brought about by the application of external heat, cold, and the chemical action which takes place within the vulcanizers. Corrosion progresses rapidly after the outer skin of the metal is broken. (See paragraphs

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Protecting Public Utility Employees on Streets & Highways

(Excluding Operation of Motor Vehicles)

Industrial Safety Series No. P.U.1

Published by the National Safety Council

20 North Wacker Drive, Chicago

Purpose and Scope

1. Public utility employees who work on the public streets and highways, in addition to the hazards involved in their work, are subject to the hazards created by street and highway travel and the occupancy of public ways. Proper precautions may greatly minimize these hazards. This pamphlet indicates the hazards, the principles on which protection is based, and gives a description of commonly used methods of protection, together with illustrations of these methods, many of which have been employed for a great many years. There are hazards to employees involved in public utility work which exist whether the work is done in areas open to public foot or vehicle traffic or not. These are the normal hazards incidental to such activities and are presumed to be covered by the normal safety rules in use by the companies involved. This pamphlet does not attempt to cover such hazards.

2. Specific utilities are mentioned in a few cases where the operations, safety practices, or equipment are normally associated with these utilities.

> This pamphlet is a compilation of experience in accident prevention. It should not be assumed, however, that it includes every acceptable procedure in the field covered. It must not be confused with federal, state or insurance requirements, or with American Standard safety codes.

3. Details such as measurements are included with the illustrations rather than with the discussion to avoid the implication that this pamphlet is a definite specification to be followed without careful consideration of other methods and the conditions encountered.

4. In areas where a number of utilities as well as municipal authorities are involved confusion will be avoided if all groups can agree among themselves on uniform methods of protection.

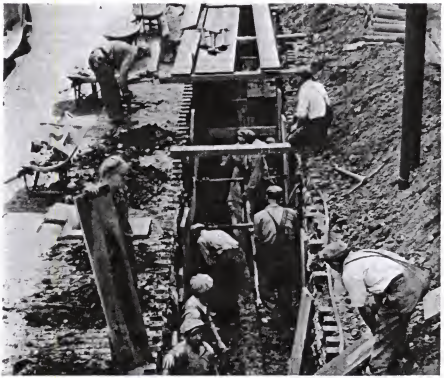

Figure 1. Trench construction at the edge of a city street. Walls are shored, and heavy material is well back from the edge of the trench so that it cannot roll in and injure workers. Bricks are neatly piled on the sidewalk. The worker at upper left has placed his wheelbarrow between himself and passing traffic. Trench braces (at the top) are placed so that they will not roll into the trench accidentally. See Paragraph 6.

5. The material herein presented is not intended to supersede state or municipal ordinances but to supplement them. Where specific state or municipal requirements exist, those interested in this general subject should familiarize themselves with them.

Street Excavations

6. It is frequently necessary to dig trenches or to make other excavations in the streets or on the highways which

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National safety council

X-HV 010 .A1 N2 Pamphlet Collection

Protecting Public Utility Employees on Streets & Highways

(Excluding Operation of Motor Vehicles)

Industrial Safety Series No. P.U.1

Published by the National Safety Council

20 North Wacker Drive, Chicago

Purpose and Scope

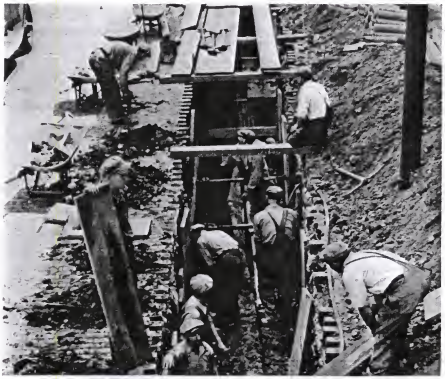
1. Public utility employees who work on the public streets and highways, in addition to the hazards involved in their work, are subject to the hazards created by street and highway travel and the occupancy of public ways. Proper precautions may greatly minimize these hazards. This pamphlet indicates the hazards, the principles on which protection is based, and gives a description of commonly used methods of protection, together with illustrations of these methods, many of which have been employed for a great many years. There are hazards to employees involved in public utility work which exist whether the work is done in areas open to public foot or vehicle traffic or not. These are the normal hazards incidental to such activities and are presumed to be covered by the normal safety rules in use by the companies involved. This pamphlet does not attempt to cover such hazards.

2. Specific utilities are mentioned in a few cases where the operations, safety practices, or equipment are normally associated with these utilities.

> This pamphlet is a compilation of experience in accident prevention. It should not be assumed, however, that it includes every acceptable procedure in the field covered. It must not be confused with federal, state or insurance requirements, or with American Standard safety codes.

3. Details such as measurements are included with the illustrations rather than with the discussion to avoid the implication that this pamphlet is a definite specification to be followed without careful consideration of other methods and the conditions encountered.

4. In areas where a number of utilities as well as municipal authorities are involved confusion will be avoided if all groups can agree among themselves on uniform methods of protection.



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National safety council

Pamphlet Collection

Compounding Materials Used in the Rubber Industry

X-HV 676 .A1N2

Part II—Dry Inorganic Substances; Gums, Oils, Resinous Materials and Waxes; Liquids and Gases

Industrial Safety Series No. RU-3

Published by the National Safety Council
20 North Wacker Drive, Chicago

1. This pamphlet is the second of a series of two on "Compounding Materials Used in the Rubber Industry." The first pamphlet, No. RU-1, is confined to the classification of organic accelerators, anti-oxidants and dry organic compounds. This pamphlet is confined to the following three groups of compounding materials:

Dry inorganic substances.
Gums, oils, resinous materials and waxes.
Liquids and gases.

2. An attempt has been made to list herein alphabetically, in the three above groups, practically all of the usual compounding ingredients used in the manufacture of rubber which are not covered in Pamphlet No. RU-1. It should be realized, however, that new compounding ingredients are constantly being developed and in some cases new and unusual uses are being made of the present ingredients. A brief description of each compounding ingredient is given, together with its use in the rubber industry, its relative health hazards and recommendations for its safe handling from a health viewpoint. Many of the solvents used in compounding rubber are flammable, certain of the dry substances used present a dust explosion hazard, and the use of various oils involves the danger of spontaneous ignition. However, the fire hazards of the substances listed are not discussed in detail, as those hazards are fully covered in other publications.

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Dry Inorganic Compounds

3. Most of the compounds in this group are of a soft mineral powder type, of a particle size less than two hundred mesh, many of less than three hundred mesh, or finer. Few of them contain hard or abrasive particles such as silica or corundum. Only a few are toxic. On the whole they are comparatively free from health hazards. However, they are all more or less dusty when handled carelessly, and the ordinary dust hazard is always present. Good storage bins, conveyors, hooded mills, and efficient exhaust systems will readily eliminate the dust hazards and in most cases prevent harm from the toxic or silica-bearing compounds. (See also National Safety Council Health Practices Pamphlet No. 4, "Dust," and Safe Practices Pamphlets No. 32, "Exhaust Systems," and No. 64, "Respiratory Protective Equipment.")

4. There are several compounds, however, that should receive special consideration, such as lead or silica-bearing compounds. These are so designated in the following list of materials.

Aluminum Flake

5. A fine cream-colored powder, consisting primarily of aluminum silicate, used as a filler in rubber. It is non-gritty and non-toxic but rather dusty in handling.

Ammonium Carbonate

6. A white crystaline or lumpy powder having a pungent odor of ammonia. It readily decomposes and gives off an irritating odor during mixing. It is used in sponge rubbers. It is slightly toxic, but there is little health hazard as it is handled in the rubber industry.

Antimony Sulphides

7. There are two types, the golden and the red antimony sulphides, used for coloring rubber articles. Some grades contain a considerable percentage of free sulphur and calcium sulphate. They are slightly toxic, irritating to the skin and the mucous membranes. Careful handling is required. (See also Industrial Data Sheet D-Chem. 22, "Antimony and Its Compounds.")

Asbestine

8. A fibrous variety of magnesium silicate used in rubber as a filler, especially in packings and gaskets. It is white powder, non-gritty and non-toxic. It should be borne in mind, however, that many of these silicates, when not pure, may contain traces of silica, and dust should be kept down.

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National safety council
X-HV 076
.A1N2
Pamphlet Collection

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X-HV 673
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#12

Safe Handling of Poles

Industrial Safety Series No. P. U. 4

Published by National Safety Council, Inc.
20 No. Wacker Drive, Chicago

Purpose and Scope

1. This Safe Practices Pamphlet covers unloading of poles at railway sidings, handling in storage after unloading, preparing for use, distribution to the points of erection, erection in place and subsequent removal for any purpose whatsoever. It is intended to outline the general safety principles involved and offer suggestions which may be used as guides in applying these principles.

2. Poles are unloaded under various conditions as indicated in the following:

a. At permanent pole yards reached generally by steam railroad sidings where the maximum of special equipment to insure safety may be available as, for example: a portable crane; one or more permanent gin poles; substantial reinforcing stakes to be inserted in spare car pockets before the shipping ties and stakes are cut; substantial skids designed for the purpose, and other special tools and equipment.

b. At temporary pole yards served generally in the same way, where trucks equipped with winches may be available for use.
   (1) When an entire car load is to be removed.
   (2) When but a portion of the load is to be removed.

c. Under the same conditions at electrified sidings
   (1) With a third rail system.
   (2) With an overhead trolley system.

3. These and many other conditions to be encountered in any section or territory influence the safety practices to be employed and adopted by a specific company or group of companies to meet their needs satisfactorily. A careful study of local conditions as well as of the facilities that can reasonably be provided is required before practices can be standardized to best meet local needs. Such standardization is an important factor in insuring the safe performance of these operations. The requirements made hereinafter are not intended to supersede municipal or state and province requirements, which must be complied with strictly.

> This pamphlet is one of a series of more than 150 Safe Practices and Health Practices pamphlets issued by the National Safety Council. As a compilation of experience from many sources, it should not be assumed that it includes every acceptable procedure in the field covered. Neither is it intended that the suggestions presented herein shall in any way supersede American Standard safety codes; federal laws; insurance requirements; state laws, rules and regulations; or municipal ordinances.

Competent Supervision

4. The foreman in charge should know in detail and in proper sequence the working practices which have been standardized by his company as safe and proper for both unloading and using poles, and should follow them rigidly. To assist in standardization practices the following precautions are suggested:

a. Before starting work on any of the tasks herein described the foreman should organize and instruct his men in their respective duties. In unloading poles, especially, he should have only those men needed to perform the necessary operations. Usually, in the unloading operations, three or four men and the foreman are all that are normally required. Unnecessary assistants tend to interfere with the operations and produce hazards by being in the way.

b. The foreman should select for any of the tasks described men who he knows can safely perform the work assigned. He should give all the orders and thereby avoid confusion, with the resultant possibility of accident. His time should be employed in directing the work and he should not be required to watch and protect persons who are not needed.

c. The foreman is reponsible for seeing that, whatever operation in the following recommended procedure is being performed, each man does it correctly and in the safest possible position.
   (1) Only one operation at a time should be in progress while unloading poles and each operation should follow the other in proper sequence.
   (2) So far as practicable only one man should be permitted on top of a loaded car. Work of unloading poles from cars and handling them subsequently should, as far as possible, be from the ends of the poles, bearing in mind that this may require a man at each end of the car, who should be in a safe position and not required to work from end to end of the car.
   (3) The use of the winch line, particularly in pulling poles off the cars, will aid in preventing muscular strains and will reduce accidents.

FIBER ROPE INSPECTION
(To Detect Acid or Caustic Burns)

ACID, acid fumes or strong alkili can quickly injure fiber rope so that it is unsafe. If exposed to these dangers, the rope should be inspected frequently—daily is not too often.

1. Look for abrasions and broken fibers on the outside.
2. Untwist the rope in several places; if the inner yarns are bright and unspotted, the rope strength has been largely preserved.
3. If black or rusty brown spots are noted on the rope, they may indicate acid or caustic burns. Unwind from the rope a piece of yarn 8 inches long and break it with your hands; if it breaks with little effort, the rope is unsafe.
4. In general, a rope that has lost its pliability or in which the fibers have lost their luster and appear dry and brittle should be viewed with suspicion and replaced with a new rope.
5. New manila fiber rope is yellowish in color with a silvery or pearly luster; new sisal fiber rope is a yellowish white color, sometimes with a slight greenish tinge; hemp is of a dark grey color.
6. Always use a rope you are sure of.

SAFETY INSTRUCTION CARD No. 72

Figure 1. Reproduction of N.S.C. Safety Instruction Card. (See paragraph 5.)

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X-HV 676
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Safe Handling of Poles

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20 No. Wacker Drive, Chicago

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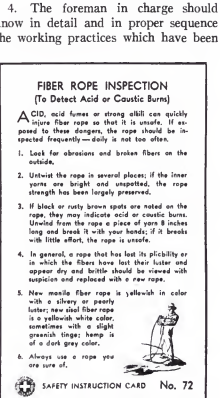

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Mill al safety ecu ed
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#15

Paper and Pulp Mill Safety

Industrial Safety Series Pamphlet PP-1

Published by National Safety Council, Inc.
20 North Wacker Drive, Chicago

1. The purpose of this pamphlet is to discuss safe methods, equipment and operations of paper and pulp manufacturing mills. It does not cover operations outside the mill yard proper, such as logging, lumbering, reforestation, marine and railroad transportation, or those involving printing and bookbinding, the manufacture of paper and fibre bags and boxes, tissue goods and specialties, and other pulp and paper goods, most of which are covered in other Safe Practices Pamphlets.

2. For the sake of uniformity and ready reference, this pamphlet, following the Safety Code for Paper and Pulp Mills (P 1-1936) approved by the American Standards Association, contains the following sections:

The Yard
Preparing Pulp Wood
Rag and Old Paper Preparation
Chemical Processes of Making Pulp
Bleaching
Mechanical Pulp Process
Stock Preparation
Machine Room
Finishing Room

This pamphlet is one of a series of more than 150 Safe Practices and Health Practices pamphlets. It is a compilation of experience from many sources. It should not be assumed, however, that it includes every acceptable procedure in the field covered. It must not be confused with American Standard safety codes; federal laws; insurance requirements; state laws, rules and regulations; and municipal ordinances. Attention is called to the Safety Code for Paper and Pulp Mills (P 1-1936), to which reference should be made; this code was formulated under the sponsorship of the National Safety Council, and under the procedure of the American Standards Association, 29 West 39th Street, New York City. The suggestions contained in this pamphlet do not conflict with the requirements in the code.

The Yard

Handling pulp wood

3. Where safety stake pockets have not been provided on flat cars, the cutting of wires and chopping of stakes should be done only by experienced and agile employees. Care should be taken first to cut the center stakes partially through. Then the end stakes should be cut. After all stakes have been cut, the binding wires should be cut—on the side of the car opposite to where the stakes have been cut—with chisels or cutters provided with long extension handles. Such extensions permit the operator to stand beyond the end of the car. To stand directly in front of the load is extremely hazardous. (See Figure 1.)

4. In some mills, overhead stake pullers are used. With such equipment, the safe method is to pull first the two end stakes on the unloading side. Then when the center or last stake is pulled the load will roll onto the loading platform without hazard to the operator whose duty it is to fasten the stake puller chain. (See Figure 2.)

Figure 1. Wire cutter with extension handle for safety in cutting binding wires. Note that the operator is standing in a safe place and is cutting the center wire last. (See paragraph 3.)

5. In unloading box cars it is important to provide substantial gangplanks with walkway surfaces cleated or otherwise equipped to prevent slipping. Such gangplanks should be of sound material and adequately secured in place. The edges should be raised to prevent trucks and other conveying equipment on wheels from rolling off. Some members also provide a substantial platform for breaking down the first tier of cordwood in the doorway.

6. As in the stock and storage yards of other industries it is important to keep material a safe distance from railroad tracks, walks and roadways. Where locomotive cranes are used for unloading or piling pulp wood and other materials, a clearance of at least 18 inches between material piles and the end of crane cab, in any position, should be maintained. Even when locomotive cranes are not used, and track is to be moved, no material should be piled or stored within 8½ feet from center line of track. As an added precaution, railroad cars should not be spotted on tracks adjacent to locomotive cranes unless the aforementioned clearances are maintained. (See Safe Practices Pamphlet No. 17, "Plant Yards and Grounds.") (See Figure 3.)

7. In many mills, one or more men devote their entire time to keeping the yard clean and orderly. Loose wood, broken stakes, binder wires and other refuse are tripping hazards, often causing injury to yard employees. It is also important when piling not to allow logs or other materials to protrude over a walkway. Piling should be in an or-

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national safety council, inc.
X-HV 676
A1N2

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X-HV 676
.A1N2

Accident and Health Hazards in Mercantile Establishments

#17

Industrial Safety Series Pamphlet No. CE-1

Published by the National Safety Council, Inc.
20 North Wacker Drive, Chicago, Illinois

Introduction

1. This pamphlet is intended to apply to any business organization selling merchandise to the public, regardless of the number of employees or the diversity of its operations.

2. Many mercantile establishments, in addition to their sales activities, conduct small factory operations on the premises. They manufacture, repair, and alter various articles such as clothing, hats, jewelry, optical material, cameras, electrical appliances, and furniture. In addition, many large department stores manufacture their own electric power, and in the same connection, supply their own steam for both heating and power plant purposes. Large restaurants are operated in many department stores for the convenience of both the public and the employees. Barber and beauty shops are maintained in most of these stores. Many stores, too, operate delivery systems varying in size from one truck to several hundred trucks.

3. The small store, on the other hand, which employs only a few persons, has the same accident problems as the large store, except that these problems are on a smaller scale and less diversified.

4. There are many references in this pamphlet calling for adherence to certain safety codes in connection with exits, fire protection, elevators, escalators, and passageways. Where reference is made to codes, it should be remembered that if local laws, ordinances, or insurance requirements are more stringent, the latter should be followed in preference to the suggestions given in this pamphlet.

> This pamphlet is one of more than 150 Safe Practices and Health Practices Pamphlets. It is a compilation of experience in accident prevention from many sources. It should not be assumed, however, that it includes every acceptable procedure in the field covered. It must not be confused with American Standard safety codes; federal laws; insurance requirements; state laws, rules and regulations; and municipal ordinances.

Accident Hazards

5. The accident hazards in mercantile establishments affect both the employees and the public. While there is a similarity in the hazards for these two groups, the methods of elimination of the hazards are necessarily different. In the case of the public, the entire premises must be made as physically safe as possible, since it is not practicable to control the actions of the public except to a minor degree. On the other hand, the preventive measures for employee injuries, while also dependent upon the elimination of physical hazards, are to a large degree based on the correction of unsafe work practices.

6. Injuries, whether to the public or to employees, are costly. The ratio of cost between the two types of injury varies according to urban or rural location and loss experience. In general, however, it may be stated that where mercantile establishments carry insurance against either type of accident, the public accident premium will be about three-fourths of the compensation premium. This ratio may vary from less than half to more than the compensation premium.

7. In this pamphlet, each accident hazard will be discussed in its relationship to both public and employee accidents. Common causes of injuries to workers and public are as follows:

a) Insufficient or improper exits.

b) Slippery, worn, or poorly covered floors.

c) Slippery, worn, poorly designed, or improperly maintained stairways and landings.

d) Poorly laid out and crowded aisles and passages.

e) Poor housekeeping in the store, shops, workrooms, shipping room, and warehouse.

f) Inadequately protected, poorly op-

Courtesy Montgomery Ward & Company

Figure 1. A modern mercantile establishment. Wide aisles, good lighting, air conditioning, and excellent fire protection are among the features. (See paragraph 81.)

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Accident and Health Hazards in Mercantile Establishments

18

Industrial Safety Series Pamphlet No. CE-1

Published by the National Safety Council, Inc.
20 North Wacker Drive, Chicago, Illinois

Introduction

1. This pamphlet is intended to apply to any business organization selling merchandise to the public, regardless of the number of employees or the diversity of its operations.

2. Many mercantile establishments, in addition to their sales activities, conduct small factory operations on the premises. They manufacture, repair, and alter various articles such as clothing, hats, jewelry, optical material, cameras, electrical appliances, and furniture. In addition, many large department stores manufacture their own electric power, and in the same connection, supply their own steam for both heating and power plant purposes. Large restaurants are operated in many department stores for the convenience of both the public and the employees. Barber and beauty shops are maintained in most of these stores. Many stores, too, operate delivery systems varying in size from one truck to several hundred trucks.

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Raw and Finished Cement Mill Grinding

19

Industrial Safety Series No. Cem-2
Published by National Safety Council, Inc.
20 North Wacker Drive, Chicago

Introduction

1. This pamphlet is a treatment of accident prevention measures that experience has shown to be necessary in the routine and auxiliary operations of the raw and finished grinding departments of cement plants. It is one of a series of six pamphlets dealing with safety in the cement industry.

2. The processes employed in the manufacture of Portland cement are known as the "dry" and the "wet." It is in the treatment of the raw materials that the processes differ. In the dry process the raw materials are crushed, dried, weighed, ground and burned. In the wet, the limestone and clay (or marl and clay) are crushed, mixed with water, ground and burned. The dry process is generally used for cement rock. The wet is employed for marl (seashells) and clay. Both processes are used for limestone and clay, shale or blast furnace slag.

3. Grinding raw material and clinker in Portland cement plants requires the use of various types of mills, separators, screens, agitators, or other special apparatus. The equipment in the raw grinding department of a dry process mill may include:

- Stone and slag dryers
- Gyratory, jaw, roll and swing hammer crushers
- Ball, tube and roll mills
- Scales
- Screens
- Belt, screw and pneumatic conveyors
- Elevators
- Dust collectors
- Air separators

In the raw grinding department of a wet process mill may be found:

- Hydraulic classifiers
- Screens
- Tube and compartment mills

This pamphlet is one of more than 150 Safe Practices and Health Practices Pamphlets. It is a compilation of experience in accident prevention from many sources. It should not be assumed, however, that it includes every acceptable procedure in the field covered. It must not be confused with American Standard safety codes; federal laws; insurance requirements; state laws, rules and regulations; and municipal ordinances.

- Scales
- Blending and slurry storage tanks
- Slurry plunger and centrifugal pumps
- Agitators
- Screw conveyors
- Elevators

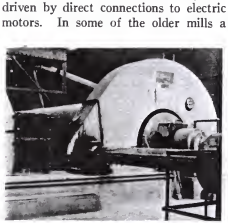
The finished grinding department of either a wet or dry process mill may employ:

- Elevators
- Pneumatic and screw conveyors
- Ball, tube and roll mills
- Dust collectors
- Air separators

General

Power transmission

4. In many Portland cement plants the principal pieces of machinery are driven by direct connections to electric motors. In some of the older mills a belt or rope drive from a line shaft, with or without friction or other types of clutch, is used. In such cases, belts, pulleys and other moving parts should be enclosed to prevent accidental contact with them. This is particularly important in the case of clutches. Some of these may break and throw out the broken parts if they are not properly adjusted. Also, static collectors should be applied to belt or rope drives, where necessary, to prevent accumulations of static electricity. When an electrical drive is employed, the frame of the electrical apparatus should be properly grounded so as to prevent shocks to the attendants in case of electrical trouble. Safety switches and push button switches listed as standard by the Underwriters' Laboratories should be provided for starting and stopping the motors. (See Figure 1.) (See also Safe Practices Pamphlet No. 29, "Electric Equipment in Industrial Plants," "The National Electrical Safety Code," and "The National Electrical Code.")



Courtesy "Pit and Quarry"
Figure 1. A safe tube mill drive. (See paragraph 4.)

5. Precautions should be taken to see that electric starters are properly identified, as to the apparatus they control, and are adequately safeguarded so that the machinery cannot be set in motion without the knowledge of the person assigned to that duty. A good rule rigidly enforced by some firms when machines are under repair is "open the switch and lock the switch box." In some cases more than one lock on the starting device may be necessary, especially if electrical and mechanical repairs are being made at the same time. Each person making such repairs should place his lock on the starting device and retain the key in his possession. No lock should be removed except by the person who placed it. Where mills are driven off a line shaft and it is necessary

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Raw and Finished Cement Mill Grinding

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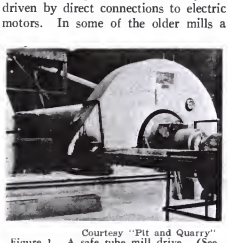

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Safe Practices In Cement Mill Shops

Industrial Safety Series Pamphlet No. Cem-4

#21

Published by the National Safety Council, Inc.
20 North Wacker Drive, Chicago

1. This is one of six Safe Practices Pamphlets on the cement industry. Other pamphlets in this series are: Cem-1, "Cement Rock Quarrying and Crushing"; Cem-2, "Raw and Finished Cement Mill Grinding"; Cem-3, "Cement Burning (Including Fuel Handling)"; Cem-5, "Storing, Packing and Shipping Cement"; Cem-6, "Cement Mill Yards and Railroads."

2. Whereas cement mill shops are essentially for the repair of cement industry machinery, the hazards for the most part are comparable to those encountered in any large general machine shop. The same problems in control of environment and human behavior are encountered, and physical hazards such as unguarded machines, unsafe floors, defective ladders, narrow aisles, and inadequate ventilation, must be eliminated. Steps must be taken, too, to control such unsafe acts as running instead of walking, using unsafe tools or equipment, working without goggles, or failing to use necessary personal protective equipment. These hazards call for a live accident prevention program.

3. In the cement mill shop, just as in any organization, the prerequisite to a successful safety program is active executive interest and participation. Experience has shown that without the interest and support of management, workers will not cooperate and the program is doomed to failure. It is not necessary for the plant executive to perform all the operations of running a safety program to show his interest. He can show it in many ways, such as by addressing group safety meetings of employees, issuing occasional safety letters over his signature and personally investigating some of the accidents that occur.

This pamphlet is one of more than 150 Safe Practices and Health Practices Pamphlets. It is a compilation of experience in accident prevention from many sources. It should not be assumed, however, to include every acceptable procedure in the field covered. It must not be confused with American Standard safety codes; federal laws; insurance requirements; state laws, rules and regulations; and municipal ordinances.

4. Supervisors must be made to realize that they are responsible for accidents in their departments, no matter what the cause. Accident prevention should be made a part of their routine duties and placed in the same plane of importance as production.

5. Workers must be convinced of the necessity for working safely. They should be made to realize that a safe employee is the most efficient employee, that the violation of company rules regarding the existence of unsafe conditions, or indulging in unsafe practices likely to lead to injury to themselves or others, will not be tolerated.

Training

6. The worker's general safety training should start when he is hired and continue throughout his entire working career. The foreman plays an important part in promoting this training. If he understands his men and has their respect and confidence, he can guide each worker at his job and maintain sufficient interest in the worker's personal welfare to assist him wherever possible.

7. Meetings of foremen, of safety committees, and of workmen are important factors in the well-balanced safety program. It is very important that the management be represented at these meetings and that it take an active interest through the plant manager, the superintendent or the master mechanic.

8. A good safety supervisor is a very valuable asset in the promotion of safety. He should become acquainted with every workman and his job, and be prepared to address the men in group meetings on matters concerning their safety. He can also be of utmost service in encouraging the development of original ideas of workers respecting safety.

9. Through the cooperation of foremen, the safety supervisor, and possibly the personnel department, the worker should be trained in the exact safe method

Figure 1. Well-located lights provide good shop illumination. (See paragraph 12.)

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Safety in Excavation Work

Industrial Safety Series Pamphlet No. Con-3

Published by National Safety Council, Inc.
20 North Wacker Drive, Chicago

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Scope

1. Although many of the safe practices discussed and advocated herein apply to all kinds of excavating work, this pamphlet is primarily for use in the building construction field. No attempt has been made to include river or harbor dredging, dam or cofferdam construction, street and road construction, trenching, quarrying, mining, caisson work, tunneling or compressed air work.

2. For safety information in some of the allied fields, and for further treatment of the subject in general, the following Council and other publications should be consulted: Safe Practices Pamphlet No. 47, "Compressed Air Machinery and Equipment"; Industrial Safety Series Pamphlets No. Cem-1, "Cement Rock Quarrying and Crushing," No. Cem-6, "Cement Mill Yards and Railroads," No. Con-1, "Preventing Accidents in Building Construction," No. Con-2, "Safety and Health in Tunnel and Caisson Work," No. PU-1, "Protecting Public Utility Employees on Street and Highways," Health Practices Pamphlet No. 4, "Industrial Dust," and the "Manual of Accident Prevention in Construction" issued by the Associated General Contractors of America, Washington, D. C. Additional information, including easily applied technical data relating to safety in the construction industry, is contained in "Safety and Economy in Heavy Construction," by R. J. Reigeluth, published by McGraw-Hill Book Company, Inc., New York City.

General

3. The term "excavating" is usually intended to mean the removal of earth, sand, clay, shale, or rock to permit the construction of foundations, basements, or other sub-surface structures such as shafts, tunnels, waterworks and pipe lines.

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4. The material to be removed may consist entirely of earth—generally mixed with various sized stones—but is more commonly a mixture or combination of earth, sand, clay, shale, or rock. Separate layers of these materials are quite common in the deeper excavations and although water may be present in the surface layers it is more frequently encountered in large quantities at lower levels.

5. Excavating work presents problems in digging, loading, transporting, and disposing of material and occasionally in blasting. The protection of employees and members of the public as well as the prevention of damage to adjoining properties is of major importance on most jobs. As far as possible, persons not immediately connected with the job should be kept off the site and if allowed entrance at all they should be accompanied by a responsible employee.

6. For the most part, the work is done by means of mechanical equipment. Most frequently the mechanical equipment consists of power-operated shovels and motor trucks. In some cases special considerations require the use of

Courtesy United Engineers and Constructors

Figure 1. A river-edge job showing cofferdam, sheet piling, bearing piles, pile drivers and excavating equipment. The job is characterized by good order in spite of the large amount of heavy equipment in such a confined area. (See paragraph 6.)

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Safety in Garages and Repair Shops

Industrial Safety Series Pamphlet No. D-6

Published by National Safety Council, Inc.
20 North Wacker Drive, Chicago, Ill.

This pamphlet is one of more than 150 Safe Practices and Health Practices Pamphlets. It is a compilation of experience in accident prevention from many sources. It should not be assumed, however, that it includes every acceptable procedure in the field covered. It must not be confused with American Standard safety codes; federal laws; insurance requirements; state laws, rules and regulations; and municipal ordinances. *Additional copies of this pamphlet are available to members of the National Safety Council. Price: 25 cents per copy, less in quantities.*

1. The purpose of this pamphlet is to present the basic requirements for safety in the operation of garages and automotive repair shops and to list safety standards for plant and personnel as developed by the experience of National Safety Council members. While nationwide accident statistics are not available for this industry, it is well known that injuries do occur. Garage work may be more hazardous in some respects than many other industrial operations. As a rule, every new job is different from the last, and while, in some cases, there are specialists in certain types of garage work, still garage men must ordinarily be prepared to do any type of work on pleasure car, truck or bus. The scope of this pamphlet will be confined to the garage application of the various machines and operations discussed. In most cases, the same machines and similar operations are completely treated in other Safe Practices Pamphlets published by the National Safety Council. Where this is the case, reference will be made to the pamphlets in which further information may be found.

2. While the operations of garages vary considerably, that is, from the storage garage where only minor mechanical repairs are made, to the complete motor car manufacturer branch agency or large private commercial garage where every conceivable type of motor vehicle maintenance work is done, the suggestions and recommendations in this pamphlet are presented so that those affecting the particular operations conducted may be easily found. It is recognized that only large operators will be able to adopt the complete list of suggestions in this pamphlet. However, even very small garages can profitably follow most of them in modified form. It is suggested that the pamphlet be studied and that such portions of it as apply to the specific operations being conducted be applied. The material in the pamphlet is discussed under the following headings:

- Selection and Training of Workers
- Building Construction
  - Construction and Layout
  - Floors
  - Ventilation
  - Ramps
  - Elevators
  - Stairways
  - Entrances and Exits
  - Illumination
- Fire Protection
- Garage Equipment and Machines
  - Gasoline Storage Tanks
  - Air Compressors
  - Machine Shop Equipment
  - Circular Saws
  - Car Lifts and Pits
  - Wash Racks
- Special Garage Operations
  - Spray Painting
  - Battery Charging
  - Abrasive Disc or Drum Operations
  - Grease Racks
  - Welding Operations
  - Tire Operations
- Miscellaneous

Courtesy West Penn Power Company

Figure 1. Modern steel and concrete garage with daylight illumination. (See paragraph 10.)

Selection and Training of Workers

3. In automotive repair work, as in other industries, successful operation depends to a large extent on the individual skill and knowledge of the employee. In the small shop where each employee is an all-around man, and must be capable of performing any of

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  - Tire Operations
- Miscellaneous

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Courtesy West Penn Power Company

Figure 1. Modern steel and concrete garage with daylight illumination. (See paragraph 10.)

Selection and Training of Workers

3. In automotive repair work, as in other industries, successful operation depends to a large extent on the individual skill and knowledge of the employee. In the small shop where each employee is an all-around man, and must be capable of performing any of

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Safety in Bakery Operations

Industrial Safety Series Pamphlet No. F-3

Published by National Safety Council, Inc.
20 North Wacker Drive, Chicago

Introduction

1. The modern bakery is a highly mechanized establishment. It presents many serious hazards in the handling and processing of materials and in the distribution of its products. The hazards associated with bakery operations can be greatly reduced by the installation of mechanical guards, safety devices, sanitary facilities, efficient lighting and ventilation equipment, and by the observance of safe practices and the provision of competent supervision.

Scope

2. It is the purpose of this pamphlet to point out the major hazards in bakery operations and to suggest methods of eliminating such hazards. The industry will be considered under two general classes: (a) Plain Baking; (b) Fancy Baking. This division has not been sharply drawn since many so-called plain bakeries produce cakes and pastry. An appendix on vehicular safety is included.

3. Plain baking includes only breadstuffs, such as bread, rolls, buns and biscuits. Fancy baking includes cakes, cookies, pies and pastry. Cracker and pretzel manufacturing will be discussed under separate headings. Macaroni manufacturing is discussed in Industrial Safety Series Pamphlet, No. F-5, "Safety in Macaroni Plants."

This pamphlet is one of more than 150 Safe Practices and Health Practices Pamphlets. It is a compilation of experience from many sources. It cannot be assumed, however, that it includes every acceptable procedure in the field covered. It must not be confused with American Standard safety codes; federal laws; insurance requirements; state laws, rules and regulations; and municipal ordinances.

General Recommendations

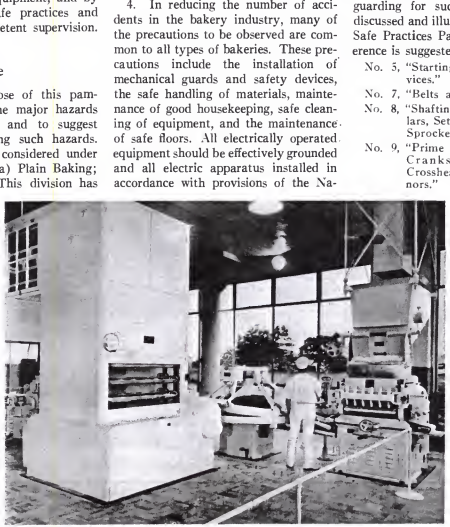
4. In reducing the number of accidents in the bakery industry, many of the precautions to be observed are common to all types of bakeries. These precautions include the installation of mechanical guards and safety devices, the safe handling of materials, maintenance of good housekeeping, safe cleaning of equipment, and the maintenance of safe floors. All electrically operated equipment should be effectively grounded and all electric apparatus installed in accordance with provisions of the National Electrical Safety Code. (See Figure 1.)

Guarding

5. All gears, chains, sprockets, belts, pulleys, shafting, clutches, couplings, keys, set screws, and other mechanical power transmission apparatus should be effectively guarded against hazardous contact, in accordance with good engineering practice. (See Figure 2.) The guarding for such equipment is fully discussed and illustrated in the following Safe Practices Pamphlets, to which reference is suggested:

No. 5, "Starting and Stopping Devices."
No. 7, "Belts and Belt Guards."
No. 8, "Shafting, Couplings, Keys, Collars, Set Screws, Pulleys, Gears, Sprockets, and Chains."
No. 9, "Prime Movers — Flywheels, Cranks, Connecting Rods, Crossheads, Tail Rods, Governors."
No. 10, "Bearings, Oilers, and Oiling Devices."
No. 58, "Construction of Machinery Guards."

6. Guards are usually constructed of wood, sheet metal, expanded metal, perforated metal, cast metal, or woven wire. Metal guards are, of course, preferable to wood guards in the bakery industry. In the purchase of bakery machinery and equipment, it is good practice to specify in the purchase order that moving parts exposed to hazardous contact should be guarded in accordance with



Courtesy Baker Perkins, Inc.
Figure 1. Adequate work space, good housekeeping, lighting and well guarded equipment help to make this a safe plant. (See paragraph 4.)

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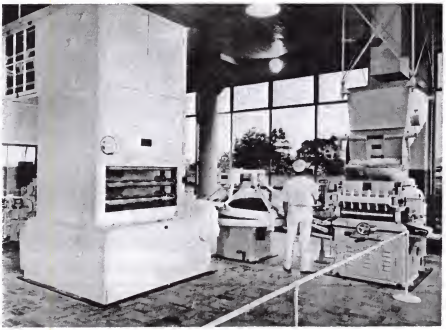

Courtesy Baker Perkins, Inc.
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Safety In the Operation of Ice Processing Machines

#28

Industrial Safety Series Pamphlet No. Ref-2

Published by the National Safety Council, Inc.
20 North Wacker Drive, Chicago

Introduction

1. The purpose of this pamphlet is to bring to the attention of plant management, supervisors and employees in the ice manufacturing industry, as well as to designers of equipment, the accident hazards encountered in the operation of ice processing machines. The physical structure of the refrigeration industry is such that little attention has been given to the elimination of its accidents, either by outside authorities or by members of the industry. The large number of small operating units, and the highly seasonable nature of operations, are, in all probability, the principal reasons for this lack of attention.

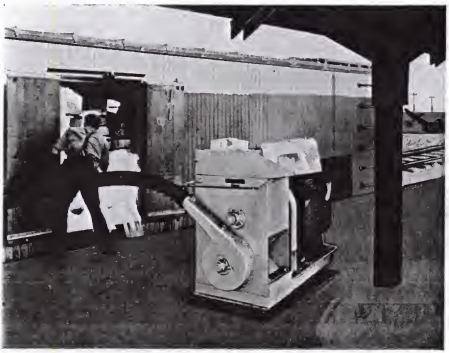
2. Management, supervision, labor, and, in addition, the ice machine manufacturer, are all vitally concerned in the prevention of injuries to ice industry workers. Accidents are costly, and their cost is borne, in one way or another, by all four groups. When the cost is high, profits are lessened in proportion, the earnings of individuals tend to decrease, employee morale is affected, and business expansion is hampered. In order to reduce the possibility of accidents, ice machine manufacturers must produce machines that are physically safe, and management must adopt these safe machines in safe plants with properly trained employees.

This pamphlet is one of more than 150 Safe Practices and Health Practices Pamphlets. It is a compilation of experience in accident prevention from many sources. It should not be assumed, however, that it includes every acceptable procedure in the field covered. It must not be confused with American Standard safety codes; federal laws; insurance requirements; state laws, rules and regulations; and municipal ordinances. *Additional copies of this pamphlet are available to members of the National Safety Council. Price: 25 cents per copy, less in quantities.*

3. Apart from the physical characteristics of ice processing machines that may result in accidents, and even more important, are the unsafe working practices of the men who use them. Injuries due to unsafe working practices can be prevented only if management, supervision, and labor cooperate in formulating and carrying out rules governing safe working practices. Where a safe machine is designed by the manufacturer, an uninformed or careless worker can render ineffective the guards provided, either by failing to use them or by otherwise making them inoperative. Then, too, accidents due to other agencies, such as handling material, using hand tools, or personal behavior, are likewise important and should be covered by specific safety rules.

4. The plant employee has the most vital stake in the ice industry—his own personal safety and welfare. He is the one person who endures the pain and suffering of an injury, and he is the one who suffers a direct financial loss in wages, for which even the most liberal compensation laws do not completely provide. His family, too, is affected because of the decreased income during the period of convalescence. If the injury is severe, or if it results fatally, then the effect on the family may extend beyond an immediate temporary handicap and cause a permanent lowering of its living standard.

5. No man *wants* to get hurt. But each year thousands of workers are injured, not necessarily because of carelessness, but rather for lack of complete knowledge of the safe way of doing their jobs. The safe practices suggested in this pamphlet are operating rules that will, if followed, greatly increase



Link Belt Co.

Figure 1. Ice slinger in operation, icing a railroad car.

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Safety In the Operation of Ice Processing Machines

329

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Coordinating Safety in Industrial and Vocational Training Programs

30

Industrial Safety Series Pamphlet No. Voc-1

Published by National Safety Council, Inc.
20 North Wacker Drive, Chicago

1. Industrial training programs designed to increase the skill and earning power of men and women in industry are rapidly increasing in number and importance. They are divided into several classes: the company-operated trade course; labor organization schools; vocational schools sponsored by local boards of education and state boards of vocational education; cooperative colleges; shop projects operated by the National Youth Administration under the Federal Security Agency, and the National Defense Training Program.

2. Safety has a definite place in the curriculum of any vocational training course. The importance of supplying safe as well as efficient workers in industry is indicated by the national statistics on industrial injuries. In one year, there were 15,500 fatalities and a total of 1,300,000 injuries, of which 50,000 were permanent injuries. The physical suffering and misery caused by these accidents, not alone to those killed or injured, but to their families and friends as well, cannot be computed. It is estimated that the cost of these accidents, covering lost wages, insurance costs, and medical expenses, is $600,000,000. This staggering cost, plus the probably greater expense due to loss of services of skilled workers in industry, certainly makes it worth while from the standpoint of efficiency alone to prevent accidents. In times of national emergency, there is an added incentive because it is then vital that every worker be kept at his job and working at maximum efficiency.

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3. In many vocational training courses, great emphasis is placed on giving the student a thorough knowledge of the fundamentals of the trade in which he is interested. He is expected, too, to develop a reasonable skill in the operation of such tools and machines as he will be called on to use. Safety, however, may not be sufficiently stressed. As a result, when the student enters industry, he must learn over again much of what he has already been taught so he can satisfy industry's demands both as to safety and production.

4. It is the purpose of this pamphlet, therefore, to show how safety training can be made an integral part of the vocational training course, and also how the publications and services of the National Safety Council, as well as other safety material, can be used to best advantage in this work.

Prerequisites to safety training

5. There are certain prerequisites to safety training which the student must have before any profitable attempt can be made to present the general or specific phases of industrial safety. They are:

a) A realization of the seriousness of the industrial accident problem.
b) A knowledge of what an industrial accident is.
c) A knowledge of the causes of industrial accidents.
d) The will to work safely.

6. There are other necessary prerequisites, of course, such as previous training and special ability for certain types of work, and certain mental and physical qualifications.

7. Where the student has mastered these fundamentals and is otherwise qualified for the work he is learning, he will be able with little difficulty, to absorb ensuing safety instructions. Without these fundamentals, he is quite likely to find

Students receive training in electric welding in a classroom specially designed for safety.

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Industrial Safety Series No. AU-2

Motor Block Testing

Published by the National Safety Council, Inc.
20 North Wacker Drive, Chicago 6

1. The testing of various types of internal combustion engines exposes the worker to certain mechanical, health, and fire hazards that require careful consideration and planning on the part of management. Mechanical hazards are involved in the handling and placing of the engines, the use of mechanical equipment and hand tools, and the possibility of equipment failure. Health hazards are present in possible exposure to toxic exhaust gases, and fire hazards are present in the use of gasoline and oil.

2. This pamphlet deals with the hazards involved in testing internal combustion engines used for airplanes and automobiles. The types discussed are airplane and automobile engines, including Diesel engines. It is the purpose of this pamphlet to point out the safe practices that should be observed if accidents are to be avoided.

General Housekeeping

3. There are several general hazards associated with engine testing. One of the most important is that created by poor housekeeping. Good industrial housekeeping is essential to any type of industrial operation, but especially so in locations where flammable liquids are handled or used.

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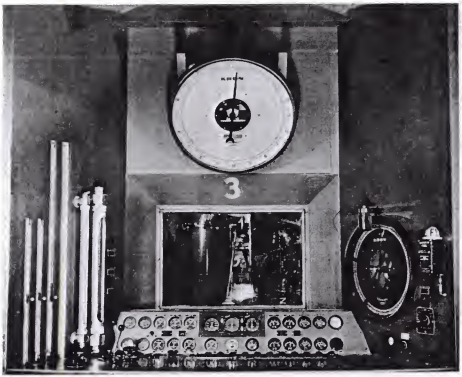
4. The removal of all surplus materials in and about the test cell or the observer's room should be a strict rule of the department, as they may become an obstruction in case of fire.

5. Metal waste cans with self-closing covers should be provided for oily waste and rags and the cans emptied daily.

6. The aisles to the test cells should be kept free of trucks or other obstacles that may cause interference in traffic or cause personal injury to workmen.

7. The handles of the test cell and other doors facing the aisle should be guarded to prevent damage by trucks. Handles so damaged might retard entrance to the cell should an emergency arise. These handles can be effectively guarded by enclosing them with a piece of sheet steel with a hole cut through for operation of the handle. On new installations, and possibly on some doors already installed, the handles may be redesigned flush with the door face.



Courtesy Buick Motor Division, General Motors Corporation

Control panel located in the observer's room. All instruments, including fire-extinguisher control, are in view of the tester. Note that gasoline and oil are in a closed system with measuring meter visible.

Fire-fighting equipment

8. Adequate fire-fighting equipment should be available. There are several kinds of extinguishers suitable for oil and gasoline fires. The type should be selected that is best suited for the particular installation to be considered. Portable and permanently piped systems are used, and sometimes a combination of both will best serve the purpose. In some testing installations automatic carbon dioxide systems have been installed and found to be effective. Where

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From SAFETY EDUCATION Magazine

National Safety Council
20 North Wacker Drive
Chicago 6, Illinois

September, 1944

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PLANET PLANE

(A Puppet Play)

By Ernestine and Florence Horvath

CHARACTERS AND COSTUMES

Mother -- Grown-up's gingham frock.

Janice -- Light hair, blue dress, black slippers.

Gene -- Simple clothing, suitable for a boy.

Truck Driver -- Grown-up clothing; carries cap (wired to his hand) in Scene I.

Tila -- A planet child. Very fantastic clothing.

SCENE I -- A room with a chair and a stool. (There may be a table, also, but it is not necessary.) A large window, rear, right of center.

SCENE II -- The planet. If possible, the backdrop for this scene should be mounted on rollers. Half of the backdrop should be painted, showing stars, planets, clouds. The second part should be a very light color, blending in with the floor of the stage. If the rollers are not used, lights should be dim during first part of the scene, brighter as the characters approach and land on the planet.

PROPERTIES: Furniture -- may be made of boxes. Should be secured firmly in place. The planet plane -- may be made of a lightweight box, painted; tapering ends, etc., should be added. Plane should be strung, like the puppets. A rock -- may be made of sponge or crushed paper, colored. Should be strung.

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Industrial Safety Series No. Con. 4

PILE DRIVING

#134

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Published by National Safety Council
20 North Wacker Drive, Chicago 6

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1. The hazards in pile driving operations are similar to those found in most types of heavy construction. To achieve and maintain safety, properly designed equipment must be used, the plant must be arranged for efficient work performance, and management should use good judgment in assigning foremen and workers to jobs for which they are fully qualified and should see that they use safe working methods.

2. When crews are selected, particular emphasis should be placed on mental alertness, agility, and physical hardiness. Leaders should be experienced foremen with the ability to direct operations skillfully. Each crew member should be well trained in the duties to which he is assigned, and should also have a working knowledge of the duties of other crew members. It is essential that the chance-taking type of worker be controlled or be eliminated from these operations.

3. Pile driving operations frequently require quick and unobstructed movement of workers and usually take place in a limited working area. Therefore, the number of men in a crew should be limited to those absolutely necessary to perform the work.

General

4. No spectators, visitors or persons other than crew members should be permitted to enter the working area.

5. Good housekeeping is especially important. The working area, walkway, and decks must be kept clear of unnecessary lines, tools, and other obstructions.

6. All gears and moving parts of machinery should be well guarded. Guards should be placed over the crosshead and crankshaft on the hoist of the pile driver to protect operators when they use foot pedals or handle ropes around nigger heads. Sheaves in locations where men's hands can be caught between the wire rope and the sheave should be enclosed.

7. Penetration measurements on piling can be made by means of a scale set up on leads of the pile driver or by markings on piles. The practice of taking the standard penetration per blow measurements of a pile while a hammer is in operation should be prohibited.

8. When pile driving operations are conducted in excavated areas, the banks should be properly sloped, sheeted, or braced to guard against cave-ins. When operations are conducted near buildings or other structures, surrounding property should be carefully checked periodically for ground movement and vibration.

9. Signals are extensively used and, because of noise or distances between workmen, must often be relied on entirely to transmit directions. Signal systems should be posted and should be thoroughly understood by both signalmen and operators. At no time should

Courtesy Tulsa District, U. S. Engineer Office

Figure 1. Revolving crane setting sheet pile, with especially constructed templet for forming cofferdam cells. Note safety skiff, ring buoy life preserver, and ladder on templet to give access to both levels.

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Vulcanizers and Devulcanizers

Published by National Safety Council
20 North Wacker Drive, Chicago 6

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VULCANIZERS

1. A vulcanizer, or heater, is an unfired vessel built to hold steam under pressure. For certain operations, hot water, gas, or air instead of steam may be under pressure, as in pot heaters and shoe vulcanizers. Heaters are used for vulcanizing or curing rubber.

2. Vulcanizers discussed in this pamphlet are those having cylindrical bodies or shells of boiler plate with one or both ends open and having cast flanged rings to support the door or doors.*

TYPES

3. There are several types of vulcanizers. The horizontal type has hinged doors (sometimes supported by wheels which swing on a floor track), or doors running in vertical guides, or removable doors. The rubber is placed in molds or pans or on press plates, forms, rolls, reels, drums, or poles.

4. The second type is the vertical type, of which there are two kinds. In one kind sometimes used for curing tires, a hydraulic ram compresses the molds in the vulcanizer, the molds being in contact with steam. The other vertical type is the pot heater, which is usually less than 8 feet deep. The object to be cured is placed in rolls in the heater, the cover is secured, and either the product is cured by steam alone or the heater is filled with water into which steam is admitted, so that the cure is by hot water under pressure.

5. A third type, known as a jacketed vulcanizer, has outer and inner shells properly supported, and space for steam between the two shells. Single jacketed heaters with internal steam coils accomplish vulcanization in the same manner as this type.

HAZARDS

6. The major hazards in the operation of vulcanizers are:

a. Vulcanizers may rupture and explode.
b. Doors may blow open from internal pressure because of improper, inadequate, or defective door fastenings.
c. Doors may open prematurely, with pressure within.
d. Cracks, extensions from the bolt slots, may occur in bolted type doors. They are mainly due to the operator's drawing up the door bolts unevenly and causing metal strain.
e. Men may be struck by molds toppling from the top of the ram on tire vulcanizers when the ram is run up so high that molds are exposed above the heater.
f. The ram on a vertical tire vulcanizer may topple over if permitted to creep out of the cylinder.
g. When provision is not made for release of possible steam generated within the ram, injuries may be incurred from steam or molds or the plate covering the spider at the top of the ram on a tire vulcanizer.
h. A man may be trapped in the heater when he enters to free a jammed or derailed car.
i. Bolts may be stripped by constant use causing excessive wear, by being drawn up too tightly, and by the use of wornout, uneven gaskets.
j. Men may be scalded when manhole covers slide aside under pressure, because of improper preparing, placing, or drawing up of covers.
k. Leaky and worn gaskets may become loose and permit excess steam and hot water to escape, causing scalds.
l. Steam entering an open heater through blow downs using common drains may cause burns.
m. Blowing off of various poorly located valves may cause burns.
n. Hot pipes, doors, molds, cars, non-jacketed surfaces, materials being cured, hot water, and steam may cause burns and scalds.
o. Men may incur bruises and lacerations from handling doors, tracks, hoists, materials, etc.

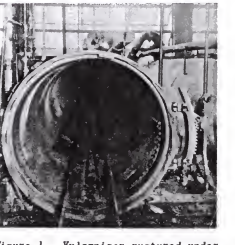

Figure 1. Vulcanizer ruptured under pressure because of defective door ring and hinge castings. The door, weighing 2,000 pounds, was hurled through a window and crashed into the side of a building 80 feet away. (See Figure 2.)

*Tire and tube heaters are discussed in Industrial Data Sheet D-Ru 1, National Safety Council.

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CASES IN HUMAN RELATIONS

Volume I

By
Members of the Faculty of Ohio University

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